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19ME761

**Seventh Semester B.E. Degree Examination, April 2018**

**Experimental Stress Analysis**

Time: 3 hrs.

Max. Marks:100

*Note: Answer FIVE full questions, selecting at least TWO questions from each part.*

**PART – A**

- 1 a. Define gauge factor and explain construction of gauge. (10 Marks)
- b. Explain method of strain measurement using wheatstone's bridge and obtain expression for output. (10 Marks)
- 2 A three element delta rosette strain gauge is cemented at a point on the surface of a machine element. The gauge factor of the strain gauge is 2.0 and the Poisson's ratio of the material of the strain gauge is 0.285. Given  $\epsilon_0 = 600 \mu\text{m/m}$ ,  $\epsilon_{120} = 300 \mu\text{m/m}$  and  $\epsilon_{240} = -400 \mu\text{m/m}$ . Determine the actual strains and magnitudes, directions of principal strains and principal stresses. Take  $E = 200\text{GPa}$ ,  $\gamma = 0.30$  and  $K_t = 0.06$ . (20 Marks)
- 3 a. Establish stress optic relation for two dimensional photoelasticity. (10 Marks)
- b. Explain with a neat sketch the principle of operation of a plane polariscope with isoclinic and isochromatics. (10 Marks)
- 4 a. Explain the shear difference method for the separation of principal stresses. (10 Marks)
- b. What are the properties of an ideal photoelastic material? Explain any three photoelastic materials. (10 Marks)

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**PART – B**

- 5 a. Explain the stress freezing technique for three dimensional photoelasticity. (08 Marks)
- b. Explain scattered light polariscope. (12 Marks)
- 6 a. Explain with a neat sketch the principle of operation of a reflection polariscope. (10 Marks)
- b. Explain oblique incidence method for separation of principal stresses of a coated specimen. (10 Marks)
- 7 a. Explain brittle coating crack patterns produced by different states of stress with neat sketches. (10 Marks)
- b. Explain the types of brittle coatings. (06 Marks)
- c. List the advantages and applications of brittle coatings. (04 Marks)
- 8 a. Explain phenomenon of Moiré techniques used for the analysis of stresses. (10 Marks)
- b. Explain displacement approach of Moiré technique for strain analysis. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.